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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/667,576	09/22/2000	Tetsufumi Tsuzaki	50212-132	7978

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EXAMINER
CUNNINGHAM, STEPHEN C

ART UNIT	PAPER NUMBER
3663	

DATE MAILED: 04/23/2002

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	09/667,576	TSUZAKI ET AL.	
	Examiner	Art Unit	
	Stephen C. Cunningham	3663	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *19 February 2002* .

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-27* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-27* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

11)☐ The proposed drawing correction filed on _____ is: a)☐ approved b)☐ disapproved by the Examiner.

If approved, corrected drawings are required in reply to this Office action.

12)☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

13)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☒ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____ .

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

14)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).

a) ☐ The translation of the foreign language provisional application has been received.

15)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____ .
4) ☐ Interview Summary (PTO-413) Paper No(s). _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: .

DETAILED ACTION

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

1. Claim 1, 2, 3, 5, 6, and 13 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kinoshita et al. '1998 in view of Inoue et al. (6-276154)

With respect to claim 1, Kinoshita et al. '1998 teach an amplifier comprising:

plurality of optical amplification sections each doped with a fluorescent material;

an optical pumping light source for pumping said optical amplification section;

a control means for controlling an optical pumping light output from said optical pumping source such that light power such that light power after amplification has a predetermined target value. See p. 259 first full paragraph line 6.

The control means adjusts a characteristic of an optical filter (variable attenuator). See figure 2. Kinoshita et al. '1998 fail to explicitly teach a filter capable of adjusting a gradient of loss with respect to wavelength. Inoue et al.

(6-276154) teach a filter that is capable of adjusting the gradient of loss with respect to wavelength. See figure 4 wherein the graph of the compensated signal is on the right. It would have been obvious to modify Kinoshita et al. '1998 by substituting the VOA of Inoue et al. (6-276154) for the VOA of Kinoshita et al. '1998 in order to provide dynamic gain-flattening by controlling the transmission slope of the VOA to reduce tilt.

With respect to claim 2, it would have been obvious for the optical filter to satisfy

$$L \cong a(\lambda - \lambda c) + b$$

because the gradient changes according to **a** as the slope of a linier function and gain tilt is roughly a linier function in the commonly used bands.

With respect to claim 3, Kinoshita et al. '1998 teach a gain-equalizing filter.

With respect to claim 5 and 6, an input power monitor is inherent in automatic gain control. Kinoshita et al. '1998 teach the use of an automatic gain control (AGC) device. It would have been obvious to use the detection device from the AGC to supply information to the control means for controlling the gradient of the optical filter in order to reduce the number of components needed in the system.

With respect to claim 13, Inoue et al. (6-276154) teach a filter wherein the sub optical paths of regions 2 and 5 have different lengths from the main optical path of the corresponding region. It would have been obvious to substitute the

VOA of Kinoshita et al. '1998 for the cascaded asymmetrical Mach-Zehnder filter taught by Inoue et al. in order to provide dynamic spectral flattening.

2. Claim 12 is rejected under 35 U.S.C. 103(a) as being unpatentable over Kinoshita et al. '1998 in view of Inoue et al. (6-276154) as applied to claim 2 above, and further in view of Clapp et al.

With respect to claim 12, Clapp et al. describes the balance point (λc) as being adjusted in the predetermined wavelength band. It would have been obvious to modify the filter as taught by Inoue et al. (6-276154) to be controlled by setting a balance point in the predetermined band thus providing a simple control scheme.

3. Claim 4 is rejected under 35 U.S.C. 103(a) as being unpatentable over Kinoshita '1998 in view of Inoue et al. (6-276154) as applied to claim 1 above, and further in view of Okuno.

The apparatus of Kinoshita '1998 in view of Inoue (6-276154) et al. fails to teach the use of a wave number monitor for detecting the number of signal light components contained in the multiplexed signal light. Okuno teaches the use of a wave number monitor for detecting the number of signal light components contained in the multiplexed signal light, and where in the control means adjusts the target value of light power after amplification in accordance with the number of signal light components detected by the monitor. It would have been obvious

to modify the apparatus by including, in the control apparatus, the channel counting device of Okuno in order to allow for the number of channels to be variable while maintaining each channel power at a constant level.

4. Claims 7 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kinoshita '1998 in view of Inoue et al. (6-276154) as applied to claim 1 above, and further in view of Inoue '1991.

With respect to claim 7, the apparatus of Kinoshita '1998 in view of Inoue et al. (6-276154) fails to explicitly teach means for detecting each wavelength and power of signal light components contained in the light output from said optical amplification section. Inoue '1991 teaches means for detecting each wavelength and power of signal light components, see figure 1 and p. 781, column 2, first full paragraph. It would have been obvious to modify the apparatus by substituting the spectrum monitoring means of Inoue et al. '1991 for the unspecified detection means in order to supply spectral shape information to the control for the filter, that is used to adjust the tilt in the spectrum, in order to achieve spectral flattening correction.

5. Claim 8 is rejected under 35 U.S.C. 103(a) as being unpatentable over Kinoshita '1998 in view of Inoue et al. (6-276154) as applied to claim 1 above, and further in view of Inoue '1991. as applied to claim 7 above, and further in view of Naito et al.

It would have been obvious to modify the apparatus to include, in the output detection, means for receiving information related to the shortest and the longest wavelengths, as taught by Naito et al. in figure 5, in order to measure tilt in the gain spectrum.

6. Claim 9 is rejected under 35 U.S.C. 103(a) as being unpatentable over Kinoshita '1998 in view of Inoue et al. (6-276154) as applied to claim 1 above, and further in view of Taylor et al.

The apparatus of Kinoshita '1998 in view of Inoue et al. (6-276154) fails to teach ASE detection means. Taylor teaches ASE detection means for detecting ASE levels and control means for adjusting the gradient of a filter so that the level difference between ASE light levels becomes constant, see column 7, line 5- column 8, line 3. It would have been obvious to modify the apparatus by substituting the ASE monitor and control taught by Taylor in order to provide a flat gain without reducing signal power through tapping.

7. Claims 10 and 11 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kinoshita '1998 in view of Inoue et al. (6-276154) as applied to claim 1 above, and further in view of Kinoshita '366.

With respect to claim 10, Kinoshita '366 teaches ASE level detection across the spectrum from a wavelength shorter than the shortest signal wavelength to a wavelength longer than the longest signal wavelength. It would

have been obvious to modify the apparatus, by including the ASE detection device of Taylor to the existing detection apparatus, to detect the ASE spectrum and use that detection to control the filter in order to flatten the gain spectrum because the ASE spectrum corresponds to the shape of the gain spectrum and taping ASE prevents the reduction of signal power inherent in tapping signal light.

With respect to claim 11, reading information from signals sent in the multiplexed signal is well known in the art. It would have been obvious to read from a longest and shortest wavelength signal in order to determine the tilt in the gain spectrum.

8. Claims 14, 15, 16, and 25 are rejected under 35 U.S.C. 103(a) as being unpatentable over Maxham et al. in view of Inoue et al. (6-276154)

With respect to claim 14, Maxham et al. teach an optical amplification method comprising:

guiding signal light to an optical waveguide doped with a fluorescent material together with a predetermined optical pumping light and amplifying the signal light;

adjusting the intensity of the optical pumping light to adjust the power of after amplification to a target value, see figure 2.

Maxham et al. fails to teach an optical filter. Inoue et al. (6-276154) teaches guiding a WDM signal through an optical filter capable of changing a gradient of loss with respect to wavelength and adjusting the gradient to reduce

wavelength-dependent gain in the amplification, see paragraphs 0013, 0014 and figures 4 and 5. It would have been obvious to modify the method inherent in Maxham et al. by adding the filter of Inoue et al. (6-276154) to any one of an input, an output, and an intermediate amplification section in order to flatten dynamically the gain spectrum.

With respect to claim 15, it would have been obvious to adjust the gradient according to a linier function because gain is approximately linier in the commonly used bands.

With respect to claim 16, Inoue et al. (6-276154) teaches gain equalization. It would have been obvious to modify the method by including a step wherein gain equalization occurs in order to flatten the gain spectrum.

With respect to claim 25, Inoue et al. (6-276154) teaches a λo in the wavelength band. It would have been obvious to control the filter of Inoue et al. (6-276154) by adjusting the balance point λo in order to provide simple control over the filter.

With respect to claim 26, Inoue et al. (6-276154) teaches, in paragraph 14, the use of Fourier expansion to calculate arbitrary loss spectrums. It would have been obvious to calculate a flat loss spectra that is substantially constant and independent of wavelength in order to adjust the level of the output.

With respect to claim 27, Inoue et al. (6-276154) teach a filter where the sub optical paths have different lengths from the main optical paths. See figure 1, wherein 21, 22, 31, 32 are couplers corresponding to couplers, in applicants

figure 3, 31, 32, 33, and 34 respectively. It would have been obvious to insert the filter of Inoue et al. (6-276154) into the amplifier of Maxham et al. in order to provide dynamic spectral flattening.

9. Claim 17 is rejected under 35 U.S.C. 103(a) as being unpatentable over Maxham et al. in view of Inoue et al. (6-276154) as applied to claim 14 above, and further in view of Okuno.

Okuno teaches detecting the number of signals light components contained in the multiplexed signal light and adjusting the target value of the light power after amplification in accordance with the detected number of signal light components. It would have been obvious to modify the method by counting channels monitored by the feedback loop, as taught by Okuno, to account for changes in the number of signals so as to make the each channel power stable in the case that channels are added or dropped.

10. Claim 18 is rejected under 35 U.S.C. 103(a) as being unpatentable over Maxham et al. in view of Inoue et al. (6-276154) as applied to claim 14 above, and further in view of Taylor et al.

Taylor et al. teaches adjusting the gradient on the basis of light power of the multiplexed signal light, see column 5, lines 14-16. It would have been obvious to modify the method Maxham et al. in view of Inoue et al. (6-276154) to

adjust the filter according to the detected light power in order to automate the control of the filter.

11. Claim 19 is rejected under 35 U.S.C. 103(a) as being unpatentable over Maxham et al. in view of Inoue et al. (6-276154) as applied to claim 14 above, and further in view of Sugaya '275.

Sugaya '275 teaches adjusting the gain tilt according to the ASE spectrum, which corresponds to the gain tilt. It would have been obvious to modify the method of Maxham et al. in view of Inoue et al. (6-276154) by monitoring ASE spectrum of the amplifier in order to provide information to the control for gain flattening because the ASE spectrum corresponds to the shape of the gain spectrum.

12. Claims 20 and 21 is rejected under 35 U.S.C. 103(a) as being unpatentable over Maxham et al. in view of Inoue et al. (6-276154) as applied to claim 14 above, and further in view of Naito et al.

With respect to claim 20, Naito et al. teach monitoring a short wavelength and a long wavelength and controlling the gain slope of a variable gain equalizer based on the monitored light. It would have been obvious to modify the method by monitoring a shortest and a longest signal light in order to control the gain slope.

With respect to claim 21, it would have been obvious to modify the method to further comprise the step of reading information related to the shortest and longest wavelength lights in order to supply a control circuit with the data necessary to accurately control the system.

13. Claims 22, 23, 24 are rejected under 35 U.S.C. 103(a) as being unpatentable over Maxham et al. in view of Inoue et al. (6-276154) as applied to claim 14 above, and further in view of Kinoshita '366.

With respect to claim 22, the method of detecting ASE light levels of each of wavelength outside two ends of the predetermined wavelength band and adjusting the tilt based on the difference is taught by Kinoshita '366, see column 12, lines 29-36 and column figure 11. It would have been obvious to modify the method of Maxham et al. in view of Clapp et al. to adjust the ASE in order to improve system performance by flattening the gain spectrum.

With respect to claim 23, Kinoshita '366 teaches detecting ASE at wavelengths shorter and longer than the signal wavelengths. It would have been obvious to modify the method to detect ASE at a shortest and a longest wavelength in order to flatten the gain spectrum.

With respect to claim 24, It would have been obvious to modify the method to incorporate a longest wavelength and a shortest wavelength information reading step in order to allow for control to be provided by an electrical control circuit.

The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

Clapp et al. (JP 11-249089);

Toba et al. (Feb 1993).

Remarks

The arguments were found to be persuasive. Rejections have been updated with specific modifications and motivations.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Stephen C. Cunningham whose telephone number is 703-605-4275. The examiner can normally be reached on Monday - Friday.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Thomas Tarcza can be reached on 703-306-4171. The fax phone numbers for the organization where this application or proceeding is assigned are 703-872-9326 for regular communications and 703-872-9327 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 703-308-1113.

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April 18, 2002

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